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By

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Abstract

The effects of music and images on littering behavior were studied at the University of Nebraska-Lincoln and on Facebook. This study investigated emotional responses to music as a stimulus and how a video impacted likelihood of change of littering behaviors. Because music and images can reach a large number of people quickly, this study can extend to other parts of the world because music and images cut across language barriers. This study can also help create effective and powerful commercials. Littering is an expensive and harmful problem, and music can affect emotions and empathy which can inspire behavior change in subjects. This study sought to advance the subjects' current stage of behavior change, and it was found the video increased the likelihood of more than fifty percent of subjects to properly dispose of trash and pick up litter. The music in the video was composed by the researcher and a collection of images were compiled by the researcher into a video which was included in a survey via Google Forms. The survey was distributed to subjects ages nineteen and older. The images may have been more powerful than the music, due to reported emotional reactions and the likelihood of littering behaviors after the video.

Keywords: music, stimulus, emotions, empathy, littering, behaviors

PREFACE

This study could not have been conducted without the help of Dr. William McMullen, Clark Potter, Dr. Dave Gosselin, and Christine Haney. I would like to thank them as well as Frances Hauck, Julie Garai, and the research participants for their assistance in the completion of this project. Furthermore, this study was made possible through the use of the University of Nebraska-Lincoln facilities, including the library.

Introduction

Littering is an expensive and harmful threat to the environment. Not only does littering cost $11.5 billion to clean annually, but also it harms waterways and wildlife according to Schultz and Stein, authors of the 2009 "Executive Summary: Litter in America" report. Because 81% of littering acts are intentional (Schultz & Stein, 2009), it is imperative to understand the causes of littering as well as how to change these behaviors quickly and efficiently through a universally understood medium.

The goal of this study is to determine how music and media can affect littering behaviors. It is important to understand these effects so further influence can reach people through mass media, social media, commercials, and word of mouth.

This study is important because music can be understood by the general population. Music can reach across language, social, cultural, and age barriers according to Taruffi, Allen, Downing, and Heaton's 2017 study entitled "Individual Differences in Music-Perceived Emotions: The Influence of Externally Oriented Thinking." Because of this, music is a good medium to use to inform a broad and diverse population. Furthermore, an effective and powerful way to address a negative environmental behavior is through the combination of music and visual media into a video. According to Mark Pedelty's 2012 book entitled Ecomusicology: Rock, Folk, and the Environment, music is more powerful when mixed with other art forms. Therefore, combining music and images can be a powerful vehicle for behavior change. Additionally, videos can be rapidly distributed online via social media, mass media, commercials and word of mouth. If there is a

correlation between music and behavior change, this will set the stage for how to change other environmentally negative behaviors.

The research question this study seeks to address is: to what extent does music and images affect peoples' attitudes about littering? Questions about littering tendencies before and after the video were asked to address this question. The null hypothesis states there is no effect between music type and littering behaviors. The hypothesis being tested against the null hypothesis is the alternate hypothesis which states there is an association between music type and littering behaviors, with negative/sad music showing a higher association on average.

Although most people are familiar with the difference between sad and happy music, it is important to understand the characteristics in the context of this study. Sad music generally contains characteristics including: slow tempo, low pitch, legato articulation, and slow tone attacks (Taruffi et al., 2017). Additionally, most sad music contains notes within the minor music scales, which include a lowered third, sixth, and seventh in the natural minor scale, or a raised seventh in the harmonic minor scale (see appendix for more details). Conversely, happy music contains characteristics opposite of sad music which include fast tempo, high pitch, staccato (or short) articulation, and quick tone attacks. Furthermore, most happy music contains notes within the major music scales, which has a raised third, sixth, and seventh compared to the natural minor scale (see appendix for more details).

Although the researcher hopes to change littering intentions, some may assume this study seeks to manipulate people. While music and media do greatly influence emotions and behaviors, this study seeks to find ways to educate people about why their current behaviors are a problem. Further, through this study, if one knows music and media can greatly influence them, they may be more aware of which media to believe. This is a positive outcome because people need to learn how to filter the consistency of various types of media.

There are a few potential limitations to this study. One limitation was time and budget constraints. First, the scope of this study was far too general and it should have been narrowed down. Or, perhaps the data collection method was just too large for one person to tackle, and a team should have been implemented to

collect the data. Additionally, data collection is costly, and there was a limited budget. Another limitation was that face-to-face collection took much longer than expected, so in order to complete the assignment and comply with deadlines, it was necessary to rapidly distribute the survey online. Most importantly, human subjects are complex and have different life experiences and different mindsets, so the results were quite varied. People may have been affected differently by the videos, and many confounding variables could have affected the results. Some examples of confounding variables include but are not limited to: distractions, absence of a controlled environment, differing empathy levels in subjects, and subjects' ability to listen to the music in the video.

Overall, litter is an expensive and preventable behavior. Because each person is at a different stage in changing their behavior, it is important to use a universally understood and powerful medium to target and inform a diverse population. Several studies have concluded music affects one's empathy, and it has been proven that consistent media exposure shapes one's attitudes and beliefs. Therefore, through the combination of music and images, this study seeks to change littering intentions with the potential of changing the problem globally.

Literature Review

Now that littering has been identified as a problem, it is important to know from where the problem originates. According to Schultz and Stein, authors of "Executive Summary: Litter in America" (2009), roadways and highways are the most heavily littered areas in America. Researchers randomly sampled 240 road segments along 3.8 million miles of roads across the United States and found 51.2 billion pieces of litter along roadways (Schultz & Stein, 2009). This translates to 6,729 pieces of litter per mile on each side of the road (Schultz & Stein, 2009). Of this considerable amount of litter, 38% of it is comprised of tobacco products, 22% is paper, and 19% is plastic. Additionally, 1.4 billion beverage containers can be found along roadways. 30% of the beverage containers are beer containers, 25% are soft drink containers, 6% are water containers, and 3% are sports drink containers. Obviously, litter on the road is a large issue. So large, in fact, it costs taxpayers, state, local, and federal governments $11.5 billion per year to clean up the litter along the road (Schultz & Stein,

2009).

Storm drains are present along the sides of roads, and drain directly into streams and rivers. One of the most frequently littered items is cigarette butts. This is quite problematic because cigarette butts contain toxic chemicals which leach into the water supply. These harmful chemicals not only get into the drinking water, but also contaminate fish habitats, which thus contaminates a food source.

While litter is quite hazardous to waterways, it is also dangerous for wildlife. Many animals accidentally ingest litter and die from it. Additionally, animals can become entangled in litter and therefore must compromise their way of life. For example, if one improperly disposes of soda rings, a duck may accidentally become entangled in it and either must live with it attached to it the rest of its life or may suffocate from becoming entangled. Furthermore, a bird may ingest plastic caps from plastic bottles which disrupt the bird's internal organs, resulting in death. These are common scenarios due to careless human actions.

Now that littering problems have been identified, it is important to consider how scientific studies have observed human behavior. In the 2009 Executive Summary, Schultz and Stein conducted behavioral observations by observing 10,000 people in 130 different locations. They found 15% of littering resulted from various contextual demands, such as availability of trash receptacles, existing litter in the area, and the distance to the trash receptacle. Additionally, 85% of the observed littering resulted from individual characteristics, including age and attitudes. The researchers found genders littered equally. Of the observed litterers, 35% of them denied littering in the past month. Furthermore, the researchers concluded that 81% of littering acts are intentional (Schultz & Stein, 2009).

This study is significant in many ways. First, people will deny they littered, even if they just littered. However, asking someone if they littered is ineffective because they may feel targeted or attacked. Second, it is important to ask more open-ended questions in surveys so as to not lead the subject to any particular answers. Third, it is reasonable to conclude that the decision to litter lies more within the individual than within the contextual surroundings. Finally, young people have been proven to litter more often than older people. Because of this, the researcher may wish to investigate the differences between younger and older age groups.

This study is significant in showing researchers what should be studied next and which questions to avoid.

Although littering is illegal, most people do not expect to get caught littering. While a fine exists in most cities and states for littering, many people get away with it. However, it is important for citizens to be aware of litterers and to report littering immediately. According to Jane Polson, President of Keep Nebraska Beautiful, if a citizen in the state of Nebraska witnesses littering, one can report the other person to the littering hotline where the litterer is entered into a database. Then, the sheriff sends out a warning to the litterer informing them it is against the law to litter and includes a litter bag so the litterer has a place to dispose of their trash (Polson, 2017). If more people were aware of the littering hotline, littering may be greatly reduced.

While addressing the issue of littering is important, behavior change will not be successful unless the Transtheoretical model of behavior change is used. According to this model, a person goes through five stages before the behavior is changed, according to Athena DuPré, author of *Communicating About Health* (2014). The first stage in behavior change is pre-contemplation. This is how a person acts before that person is aware of a problem. The second stage is contemplation-a person is made aware of an issue and starts thinking about the issue. The third stage is preparation in which a person decides to take action regarding the issue. The fourth stage is action, where a person actually makes the change. The fifth and final stage is maintenance where a person must adhere to the change for six or more months. Further, each individual reacts differently to a message depending upon the individual's current stage. Therefore, each tested subject will be at a different stage, and will react differently to the same message.

Because the process of behavior change has been identified, it is important to recognize how music and media have an impact on human behavior. People develop beliefs about the world based on many influences, including the media (DuPré, 2014). Consequentially, these beliefs are stronger if the media images are highly consistent, if people are exposed to large amounts of media, and if people have a limited basis for evaluating what they see and hear (DuPré, 2014). Since many people are influenced by the media, using media to shape behavior and attitudes is logical. According to a 2016 study conducted by Nosal, Keenan, Hastings, and Gneezy entitled "The Effect of Background Music in Shark Documentaries on Viewers' Perceptions of Sharks," mass

media has wrongfully portrayed sharks for decades. Most people are familiar with JAWS, which portrays a terrifying shark in combination with ominous music to evoke fear in viewers. Because of the JAWS theme, and media portrayals of rare shark attacks, people have been perceiving sharks as a threat to their safety. In the study, researchers tested musical influence on peoples' attitudes toward sharks. First, the researchers separated their subjects into three groups: negative, silence, and uplifting. Each subject watched the same video with sharks, but each video had different background music. Those listening to negative music had more negative feelings about sharks and those listening to uplifting music had more positive feelings about sharks. Because of this, the researchers concluded that music and media influenced the subjects' attitudes and feelings toward sharks.

While media may influence people, social relationships can also greatly affect behaviors. According to a study done by Jennifer Long, Nikki Harre, and Q. Atkinson entitled "Understanding Change in Recycling and Littering Behavior Across a School Social Network" (2013), social relationships influence and shape behavior because humans learn through imitation. Social groups and social norms greatly influence a person's behaviors because if a person wishes to fit in, that person must adhere to the norms of the group. This study further indicated littering is acceptable among some young people and if a young person picked up another's litter, that person was bullied and insulted (Long et al., 2013). Interpersonal influence plays a large role in a person's littering behaviors. Because of this, it is important to target littering messages to young people and focus on changing friend group norms. One way to achieve this is through the careful use of media, such as music, cinema and television, which are prominent features in a young person's everyday life.

Clearly, many factors influence behavior. However, music is a good vehicle for shaping behaviors because it can be understood universally across cultures (Taruffi et al., 2017). Although most people generally understand music, it is important to define music specifically. Music is a type of stimulus, according to Eric F. Clarke, author of *Ways of Listening: An Ecological Approach to the Perception of Musical Meaning* (2005). Furthermore, humans actively seek various stimuli to learn more information about their environment. For example, tapping one's foot or dancing would be an active response to music as a stimulus. Additionally, Peter

Kivy, author of *Music Alone: Philosophical Reflections on the Purely Musical Experience* (1990), states that musical enjoyment is a natural response to music as a stimulus. Furthermore, according to Malcom Budd, author of *Music and the Emotions: The Philosophical Theories* (1985), music communicates moods, feelings and emotions and is a combination between the experience of what the music expresses and how that expression affects one's emotions. Similarly, in the 2016 article entitled "Music and Sustainability: organizational cultures towards a creative resilience-a review," written by Kagan and Kirchberg, the arts are a vehicle for communication. The arts seek to express what words fail to do. Together with Kagan and Kirchberg's work, Mark Pedelty, author of the 2012 book *entitled Ecomusicology: Rock, Folk, and the Environment*, writes about the increase of effectiveness of music on people when mixed with other art forms. Music should be used to enhance the understanding of the environment since music enhances many things, including films and daily activities (Pedelty, 2012). Ultimately, music is a stimulus used to communicate moods and feelings, which can enhance communication and understanding of various art forms.

Although music can transmit emotions, a person's openness to experience affects how a person experiences the music. According to Silvia, Fayn, Nusbaum, and Beaty's 2015 study called "Openness to Experience and Awe in Response to Nature and Music: Personality and Profound Aesthetic Experiences," subjects listened to a song and viewed images of nature, and those who were more open to different experiences experienced chills and goosebumps more often than those who were not open to new experiences. Additionally, goosebumps and chills were higher when people were familiar with the song. Further, those people who were open to new experiences felt less isolated and a part of a larger community when exposed to music and images of nature. "Musical experience offers humans a possible channel to acknowledge their link to their shared aliveness" (Kagan & Kirchberg, 2016). Because music has been around for centuries, it is a good tool to use to bring diverse people together. Bringing people together creates a stronger community, which is a positive environmental outcome. As shown above, openness to experience greatly affects one's reactions to musical experience.

While music can evoke profound reactions, it can also affect empathy greatly. Cognitive empathy is the

ability to understand another's emotions and to imagine how the other person is feeling, according to Miu and Baltes's 2012 study entitled "Empathy Manipulation Impacts Music-Induced Emotions: A Psychophysiological Study on Opera". Further, Miu and Baltes concluded humans can not only perceive feelings in music, but also they experience genuine emotions when listening to music. This is because listeners know the music is related to imaginary events so they feel safe to respond with and experience similar emotions the performer conveys. Because music greatly influenced the empathy of their subjects, this study proves that music is a good medium for addressing behavior change through empathy. By showing subjects music and images, it is possible to awaken the empathy of the research subjects.

While targeting one's empathy is a good way to change behavior, it is important to note that, just as each person is at a different behavior stage, not everyone experiences the same level of empathy. For example, those with higher empathy levels are able to correctly identify emotions in music, and are able to determine emotions in music more than those with lower empathy levels (Taruffi et al., 2017). Therefore, empathy level is a variable which can be discussed that may impact results.

Although empathy levels vary, it is important to use a constant variable, such as scientific facts, within the video. Music can enhance these facts. According to Aaron S. Allen, author of "Prospects and Problems for Ecomusicology in Confronting a Crisis of Culture" (2011), scientists frequently downplay the urgency and danger of their findings to remain subjective and non-activist in the public eye. But music can accurately display the urgency of these findings through the use of dissonance and characteristics of sad music. Overall, this study combined the scientific findings about litter with music to show the world just how dangerous and expensive litter truly is.

All in all, music can be understood globally, and one does not need to speak a certain language to comprehend it. Because music can reach people beyond language barriers, it can have a widespread effect. While many factors contribute to a person's behaviors, the literature has shown empathy level, openness to experience, media exposure, and behavior stage affect the way in which people respond to music and images as

a stimulus.

Materials and Methods

This study's research design followed Nosal et al.'s (2012) design, which was to place subjects randomly into three groups including: sad music, silence, and happy music with the same images playing. Placing subjects randomly into a category, or random assignment, makes it possible to infer causation, according to Tintle, Chance, Cobb, Rossman, Roy, Swanson, and VanderStoep's 2016 book entitled *Introduction to Statistical Investigations*. Random assignment allows the researcher to speculate the reasons as to why the subjects reacted in a certain way. As previously mentioned in the introduction, sad music is characterized by notes in the minor scale, or a lowered third, sixth, and seventh. It also includes slow tempo, legato articulation, and low pitches (Taruffi et al., 2017). Furthermore, happy music is characterized by notes in the major scale, or a raised third, sixth, and seventh. It includes fast tempo, staccato articulation, and high pitches. Because of this, the music was created based on those characteristics. All music was made using the "Garage Band" app, and the instrument used was guitar for both happy and sad groups. The images were acquired from Google search, and showed a picture of a pristine natural scene and then showed the same area with litter. The addition of the un-littered natural images was employed to keep the video neutral. Alternating scenes of beauty and nature were compiled into a video using Windows Live Movie Maker, and the videos were uploaded onto YouTube. Putting the videos on YouTube allowed the researcher to include the video directly into the survey.

The survey was created and distributed via Google Forms to students nineteen years of age or older on the University of Nebraska campus as well as to Facebook users. Since only one person collected the data, the sample size was sixty-seven people. If time permitted, the sample size would have been at least 100 people in each category. Nevertheless, there were twenty-four people in the sad category and twenty-seven in the happy category, and 16 in the silence category. Face-to-face sampling allowed for the best quality of responses

because subjects were able to ask the researcher clarification questions. Furthermore, the researcher could make sure the subject was watching the correct video and was actively engaged in the content. Facebook sampling allowed the researcher to get many responses very quickly but was not able to monitor the subjects and was only able to answer questions electronically. However, it also provided a quick and easy means of follow up in which the researcher was able to ask subjects if they understood the questions and experienced the video correctly with or without sound. The researcher did not keep track of how many surveys were completed online or face-to-face.

An iPhone was used as a surveying device for face-to-face survey collections. Additionally, face-to-face participants received a candy incentive. Through Google Forms, responses are recorded and saved automatically. Before the video, subjects were asked their age, gender identity, activities when they are most likely to litter, likelihood to pick up trash where it does not belong, and how much of an impact they believe their individual littering and trash has on the environment. Then, subjects watched the seventy-second video. After the video, subjects reported their emotional reaction to the video as well as their likelihood to pick up trash, their likelihood to tell others not to litter, and their likelihood of properly disposing of their trash. Then, the results were compiled into tables and graphs. For each question, the total responses were compiled into either a pie chart or a bar graph.

For each response, the data were entered into the ISI Theory Based Inference Applet. The Theory Based Inference Applet allows the researcher to test the results against the null hypothesis. By using a standardized statistic, or Z-statistic, one can determine if there is strong or weak evidence against the null hypothesis. A Z-statistic is the distance of the statistic from the mean, divided by the standard deviation of the mean. When the values from the calculation are from -1.5 to 1.5, there is little to no evidence against the null hypothesis (Tintle et al., 2016). Unfortunately, all of the responses fell between -1.5 and 1.5, so there was no evidence against the null hypothesis. Although the results are not statistically significant, they could be if more data was collected.

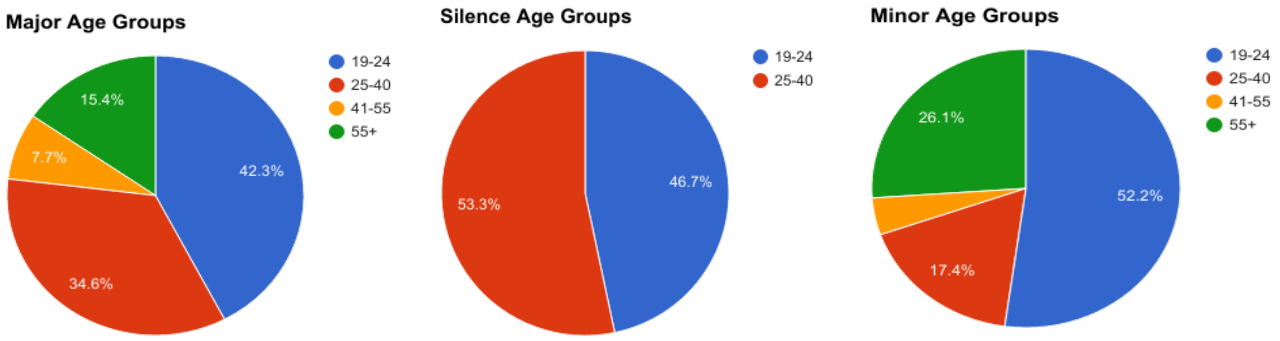
Because human subjects were involved in this study, it is important to protect the privacy of each subject. Because of this, each subject was presented with a consent letter before participation in the survey. The

consent letter explained the purpose of the study, and informed subjects they could withdraw from the study at any time without harming their relationship to the researcher. It also gave them contact information if they had further questions. If this study had statistically significant results and was going to be published, permission from the Institutional Review Board would need to be obtained. However, when contacting the Institutional Review Board, or IRB, the head of the department said it was not necessary to obtain the IRB permission since the results were being presented to a class and not being published. However, if this study were carried out on a larger scale, an IRB would need to be obtained.

Results

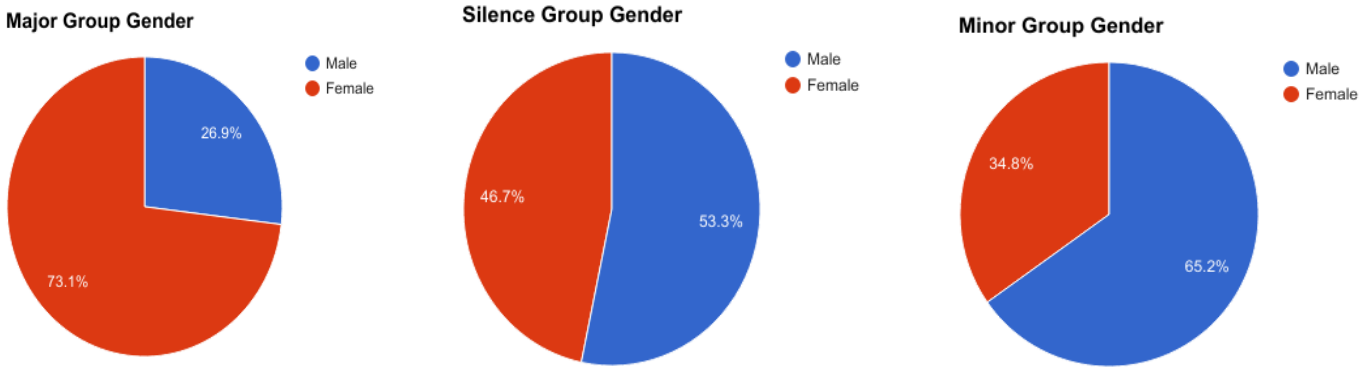
None of the results are statistically significant, so this section is primarily focusing on trends within the data. Although the results are not statistically significant, the respondents were randomly assigned into one of three categories, which allows causation to be inferred (Tintle et al., 2016). It is important to find trends within the data to understand how to conduct the research better in the future.

There were 27 respondents in major, 16 respondents in silence, and 24 respondents in minor categories. The first question the survey asked participants was their age, which was separated into four different categories: 19-24, 25-40, 41-55, and 55+.



These pie charts represent the age groups surveyed. The major and minor categories represent people from all age groups. The silence group represents the younger population. In Long et al.'s study and the 2009 Executive Summary

Report, age was a major factor determining if a person littered. These studies suggest younger people litter more often than older people.



The results of gender in this study were quite interesting. Subjects were randomly placed into each category, yet the major group is mostly female subjects (73.1%), the silence group is almost half male subjects (53.3%) and half female subjects (46.7%), and the minor group is mostly male subjects (65.2%). Gender was measured within the survey question because, according to the 2009 Executive Summary, gender did not influence littering behaviors (Schultz & Stein). Because of this, it was important to see if these results showed a lack of correlation between gender and littering behaviors. Furthermore, this is a good question to ask to get participants warmed up to answering more difficult questions, without having much of an impact on results.

Most likely to litter when...	Major	Silence	Minor
Walking	7.7%	0%	7.7%
Driving	34.6%	15.4%	61.5%
In Public	15.4%	7.7%	0%
Not in Neighborhood	7.7%	15.4%	15.4%
Smoking	19.2%	7.7%	0%
Drinking	11.5%	23.1%	7.7%
Eating fast food	3.08%	7.7%	7.7%
Other	19.2%	30.8%	23.1%

After people answered questions about their age and gender, people then answered their likelihood of littering during daily activities. In the major and minor categories, the highest reported likelihood of littering was when driving (34.6% in major and 61.5% in minor). This agrees with the 2009 Executive Summary Report. Other numbers which had a

tendency to agree with the Executive Summary are highlighted in yellow, and those which tended to disagree were highlighted in red. The next largest category of litter found along roadways was cigarette butts, and in the major category, this was the next highest reported likelihood of littering (19.2% of respondents). Another heavily littered item are beverage containers along roadways, and in the silence category, 23.1% of respondents reported a likelihood to litter when drinking. While these tendencies agree with the 2009 Executive Summary, there were a few reported likelihoods which do not match the research.

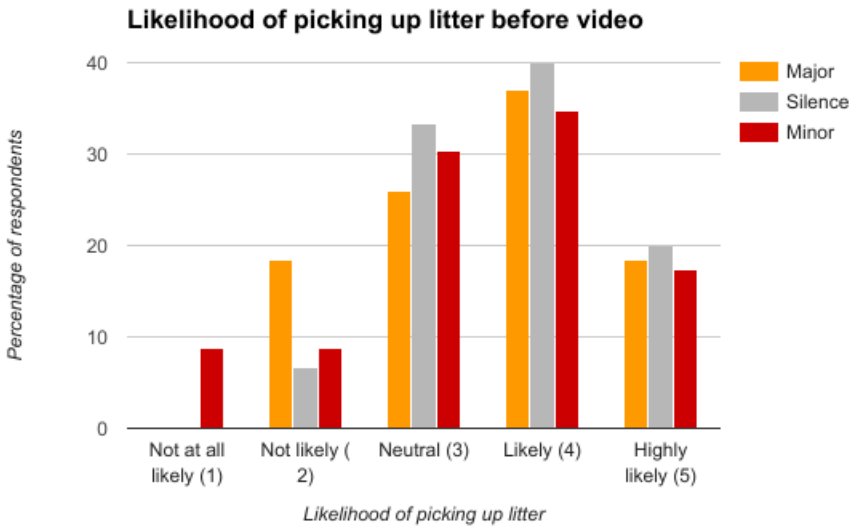
Within the 2009 Executive Summary (Schultz & Stein), it was found that pedestrians produced around 23% of litter along roadways, but nobody reported likelihood to littering in the silence category, and only 7.7% of respondents reported likelihood in the major and minor categories. This could be due to the fact the respondents do not walk frequently, or they simply do not have trash when walking. Another trend which disagreed with the Executive Summary was the reported likelihood to litter when smoking in the silence (0% of respondents reported) and minor categories (7.7% of respondents reported). This could be because these subjects do not smoke, and therefore have no tobacco products to litter.

The results highlighted in blue represent a category not covered in the research. This variable sought to determine if people were more likely to litter if they were not in their own neighborhood. 15.4% of respondents in the silence and minor categories and 7.7% of respondents in the major category reported a likelihood to littering when in a different neighborhood. This could be because they care about how their neighborhood looks, how their neighbors will perceive them, and the fact they will have to clean up litter from their yard. Therefore, if littering happens outside of a person's neighborhood, they are much less likely to care, because littering is no longer their problem.

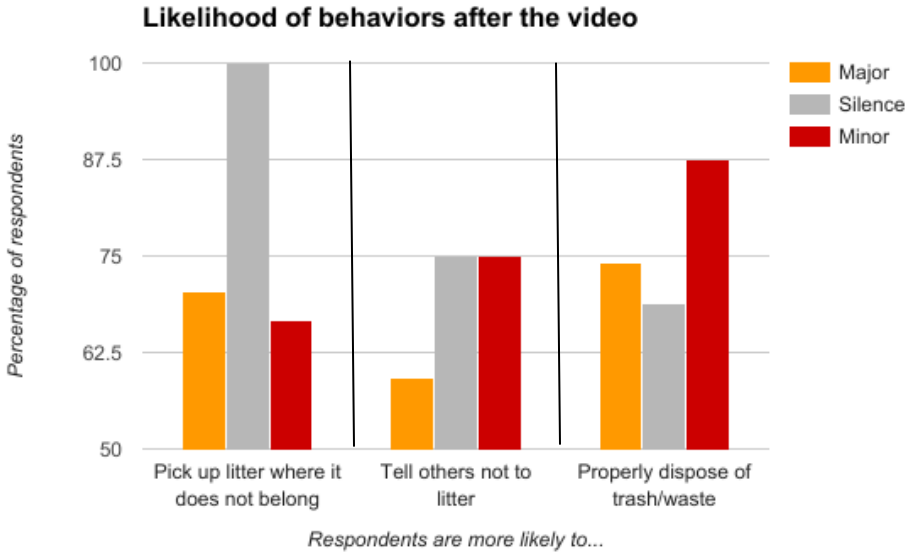
The "other" category, highlighted in green, showed the percentage of respondents who reported they never litter. In the major category, 19.2% of people did not report a likelihood of littering when presented with daily activities, and 23.1% of people did not report a likelihood of littering in the minor category. In the silence category, which was comprised of mostly young people, 30.8% of respondents did not report a likelihood of littering during daily activities. This disagrees with both Long et. Al, and Schultz and Stein's research, because the youngest people reported they were not likely to litter. However, based on the Schultz and Stein research, many people say they do not litter and they actually do. Therefore, one must not wholeheartedly believe the reports in this category. This survey question clearly

was important in order to determine the likelihood to litter during daily activities. Overall, the reported likelihood of littering behaviors before the video allows one to measure how the video impacted respondents. This is a good quality control measure and to be able to test the hypothesis effectively.

Next, the survey asked respondents how likely they were to pick up trash before and after the video.



Before the video, about thirty percent of respondents in each category were neutral when asked if they were likely to pick up litter. Additionally, about forty percent of respondents before the video were likely to pick up litter, and only about twenty percent of respondents were highly likely. Additionally, about eighteen percent of those in the major group said they were not likely to pick up litter before the video, and around eight percent of people in the minor group were not likely and not at all likely to pick up litter before the video. Furthermore, around six percent of people in the silence group reported they were not likely to pick up litter before the video.



After the video, 100 percent of respondents in the silence category were more likely to pick up litter. Before the video, 40 percent of respondents were likely to pick up trash, and 20 percent were highly likely to pick up trash. Therefore, the video impacted 40 percent more respondents in the silence category to pick up litter. Therefore, the images themselves were powerful enough to affect littering behaviors alone.

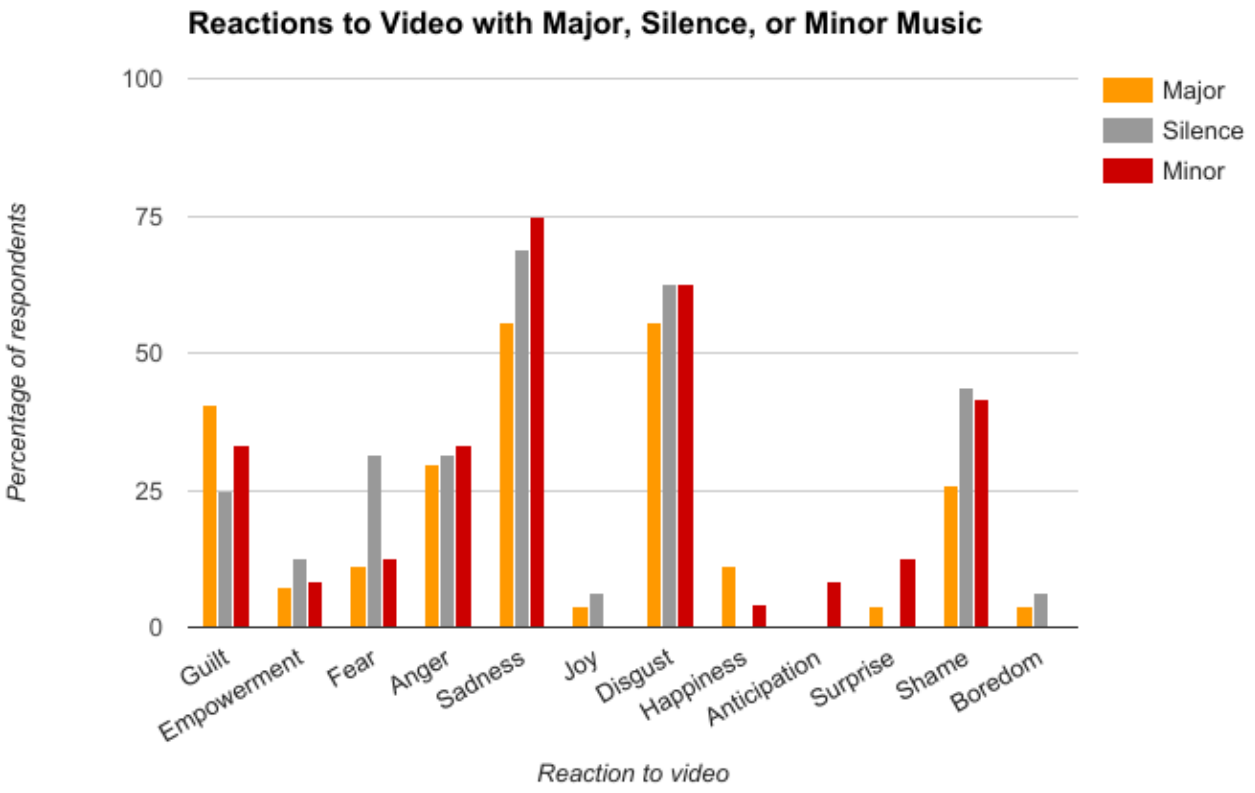
In the major category, 70.4 percent of respondents were more likely to pick up litter after the video. Before the video, 37 percent of respondents were likely to pick up trash, and 18.5 percent of respondents were highly likely to pick up trash. Therefore, 14.9 percent more of respondents in the major category were more likely to pick up litter. Similarly, in the minor group, 34.8 percent of respondents were likely to pick up litter and 17.4 percent were highly likely to pick up litter before the video. And after the video, 66.7 percent of respondents were more likely to pick up trash where it did not belong. Therefore, 14.5 percent more of respondents were more likely to pick up trash after the video.

Because of these results, one may wish to accept the null hypothesis that there is no association between music and media on littering behaviors and may formulate a new hypothesis that images affect people more than music and images. The second part of the hypothesis stated negative music would have a higher association on average. However, negative music seemed to have the least impact on people. This will be discussed in further detail in the discussion section as to the reasons why these results may have occurred.

While the comparison of likelihood to pick up trash before and after the video did not support the original hypothesis, looking at likelihood of those in the minor category who were more likely to dispose of trash and waste after

the video supports the original hypothesis because 87.5 percent of those in the minor group reported they were more likely to properly dispose of their trash. Additionally, 75 percent of those in the minor category said they were more likely to tell others not to litter after the video. Overall, the video impacted the littering behavior of respondents.

The likelihood of behavior change was the primary measurement for this study. However, another important and interesting measurement was the subjects' emotional responses to the video.



From this chart, one can tell those in the minor category experienced more sadness and anger than those in the silence and major categories. However, it did not insipre them to change their behavior as much as those in the silence and major groups as previously discussed. Additionally, those in the silence group and minor group experienced more shame than those in the major group. Conversely, those in the major group experienced more guilt than those in the minor and silence groups. There are many reasons as to why people may have been affected by these emotions differently, and these reasons will be discussed in the discussion section of the paper.

Discussion

Although the results were not statistically significant, it is still important to interpret trends in order to plan how to do further research better. Small sample sizes, and the measuring of too many different factors led to no statistically significant results. Furthermore, the researcher should have chosen one sampling method, or should have kept track of how many responses were face-to-face and how many were online. Therefore, in future research, it is important to have a much more organized and simple research design. Despite this, important trends are discussed below.

First, in Long et al.'s study and in the executive summary report, younger people tend to litter more often than older people. However, the results shown in the previous section show one hundred percent of those in the silence category, which represented the youngest group of respondents, are more likely to pick up litter after watching the video. Even before the video, those in the silence category were likely to pick up litter, but they represented the highest increase of liklihood to pick up litter (40%).

Next, the executive summary (Schultz & Stein) showed genders litter equally. The results show this to be true. Those in the silence category were about half male and half female, and one hundred percent reported they were more likely to pick up litter after viewing the video. Further, the major category was comprised mostly of female subjects and the minor was comprised mostly of male subjects, and both categories reported a fifteen percent increase in likelihood to pick up litter after the video.

As previously stated, there was only an increase of fifteen percent in the likelihood to pick up litter, and there was a forty percent increase in the silence category to pick up litter after the video. Consequently, this supports the null hypothesis that there is no association between music and media and littering behaviors. Further, the alternate hypothesis stated there would be an effect, and negative music would have a higher association on average, in accordance with Nosal et al.'s study. However, the negative music seemed to have the opposite effect of that in the original hypothesis. This may be because people felt there was no hope to the problem of littering, or they felt guilty. One respondent provided follow-up and said the video evoked the same feelings as the commercials aboout abused animals. Generally, people who watch these commercials quickly change the channel when the commercial is displayed to avoid feeling negative emotions. Because of this, the negative video may have produced this effect in respondents. Therefore, in the future, it is important to create videos which are not too negative. This can be done by adding more

neutral images and music with a combination of both happy and sad characteristics. It is important to get the message of not littering across to viewers and listeners, however it is also important not to belabor the message, which, according to the results, was done. Although there was no true association between music type and littering behaviors, the video was still effective to get respondents to increase their likelihood of picking up trash and disposing of trash properly. Therefore, the video was effective in changing behavior.

Another important aspect to consider when interpreting the data is the stages in behavior change. By looking at the likelihood of picking up litter before the video, those who reported not likely to pick up litter may not be aware of the impacts of litter, which, according to duPre (2014), is the first stage in behavior change. Therefore, the video would seek to advance these respondents to the next stage of behavior change-awareness of a problem. If people are aware of the impacts of littering on the environment, the video would seek to advance respondents to the contemplation stage, where one thinks about changing their behavior and littering less. Those in the silence category were likely at this stage, and the video advanced them to the behavior change stage. Ultimately, the goal of the video is to advance respondents to the next stage in behavior change. This could have been measured better within the survey by specifically asking respondents how they feel about littering. In the future, a question regarding this will be asked.

The overall emotional reactions of the respondents were quite varied. This is most likely due to the fact that each person has different empathy levels. This agees with studies discussed in the literature review, such as the studies done by Taruffi and colleagues (2017), and Miu and Baltes (2012). For further study, it would be beneficial to measure empathy levels in the survey question. Additionally, the video may have impacted those with an open mind more, in accordance with Silvia and colleagues' 2015 study, so it would be important to measure this factor, as well.

In conclusion, there were many implicative trends of the results which both agreed and disagreed with previous work done in the field. However, due to many differing variables among subjects, the design of the research needs to be reconfigured. Additionally, it may be necessary to break down each different variable and then bring them together. For example, one may wish to measure the empathy levels, openness to experiences, and awareness of littering separately. Furthermore, more subjects would be needed to produce statistically significant results, and measuring each subject face-to-face reduces the confounding variables. Some confounding variables include: subject's volume not being turned

up, distractions around viewer, and error in interpreting questions. Furthermore, it would be very beneficial to conduct follow-up surveys to measure if subjects actually changed littering behaviors.

Summary and Conclusions

This study was conducted to determine if music and images had an impact on littering behaviors. Subjects ages nineteen and over were recruited to participate in the survey. The study was conducted on the University of Nebraska-Lincoln campus and on Facebook. The survey was distributed via Google Forms. This study sought to address the effects of music and media on human emotions and littering behaviors. The study measured the extent to which music and images affect the likelihood of subjects to litter. Specifically, based on the research, the survey measured emotional reactions to the video, tendencies of littering in everyday activities, and general demographic questions.

The extent to which music and media can change littering behaviors can be seen in the likelihood of behaviors after the video. One hundred percent of those in the silence group are more likely to pick up trash, which is a forty percent increase in likelihood before the video. Further, more than half of respondents were more likely to properly dispose of trash, pick up litter, and tell others not to litter. These results suggest the video impacted the respondents' feelings about littering, and may have advanced their stage of behavior change.

As was discussed in the discussion section, future research on this topic is needed in order to better inform the public through effective and efficient commercials. In future research, one should measure subjects' empathy levels, current mood, and open-mindedness. One may also wish to use technology to measure emotions caused by music, such as the Geneva Emotional Musical Scales Technology. This was discovered after data collection, but this technology may further advance the accuracy of measuring emotions of subjects. A controlled environment and face-to-face data collection of at least one hundred subjects in each category is essential. The controlled environment and face-to-face interactions would reduce the amount of confounding variables. Future research on this topic can extend to other problem behaviors, on a larger scale, and can help inform the public through the use of powerful commercials which can combat behavioral environmental issues both locally and globally.

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Appendix A

Survey Questions

1. How old are you?

2. With what gender do you associate?

3. I am most likely to throw my trash someplace OTHER than a trash can when I am: (Check all that apply)

4. How likely are you to pick up trash where it does not belong?

5. What impact do you think your individual trash and littering behaviors have on the environment?

-Please watch this short video to continue to the rest of the survey-

6. What was your initial reaction to the video? (Check all that apply)

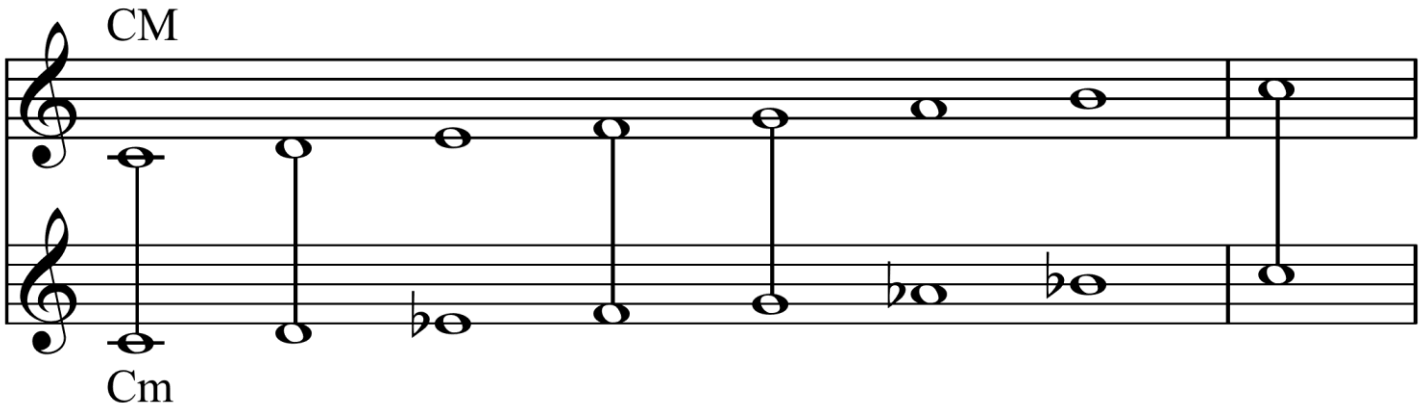
7. How much MORE likely are you to...(Check all that apply)

8. If I have ever thrown away trash in someplace other than a trash can, I think it ends up... (Check all that apply)

Link to the survey: https://docs.google.com/forms/d/1soVkrB-JiLpH1dApH-o-cuLqS7uylsqNElCPViMcLGw/edit

Appendix B

Musical scales



Source:

https://www.google.com/url?sa=i&rct=j&q=&esrc=s&source=images&cd=&cad=rja&uact=8&ved=0ahUKEwjmiNyHxsbTAhXL5YMKHaH6DTgQjRwIBw&url=https%3A%2F%2Fcommons.wikimedia.org%2Fwiki%2FFile%3AMajor_and_minor_scales.png&psig=AFQjCNGPdiHfkERzVmiRS7ACymDqD3OvwQ&ust=1493448151538293

The top scale, CM, is a major scale. Most happy music is played within a major key, which includes a raised third, sixth, and seventh. Notes within the happy music are usually within the Major scale.

The bottom scale, Cm, is a minor scale. Most sad music is played within a minor key, which includes a lowered third, sixth, and seventh in the natural minor scale. In a harmonic minor key there is a lowered third and sixth, and a raised seventh. Notes within the sad music are usually within the minor scale.